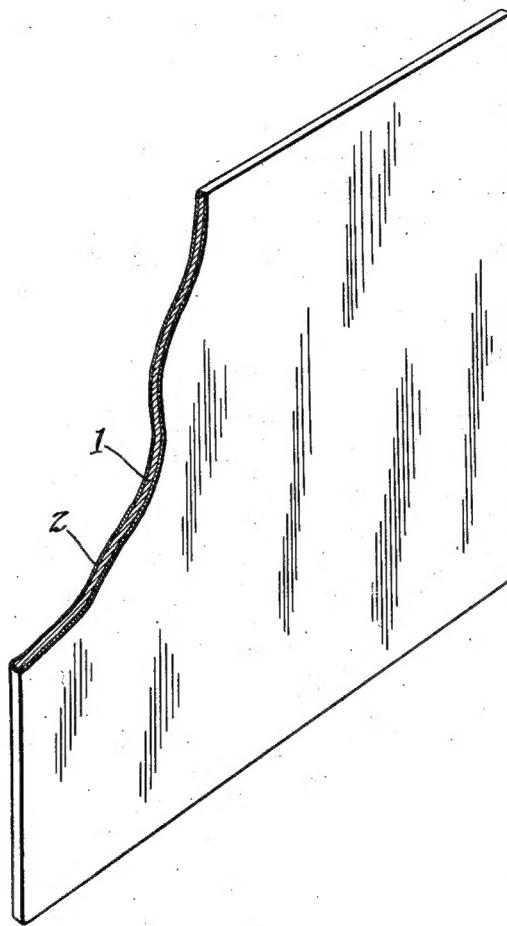


T. A. EDISON.  
ELECTROPLATING.  
APPLICATION FILED JUNE 21, 1919.

1,359,972.

Patented Nov. 23, 1920.



Witnesses:

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Witness:

# UNITED STATES PATENT OFFICE.

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## ELECTROPLATING.

1,359,972.

Specification of Letters Patent. Patented Nov. 23, 1920.

Application filed June 21, 1919. Serial No. 305,821.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Electro-plating, of which the following is a description.

My invention relates to electro-plating, and more especially to the electro-plating of metals on metals.

When a metal is plated electrolytically directly upon another or the same metal, it is usually very difficult to separate, remove or strip the metal which is plated from the metal plated upon. This is especially true in the case of either nickel, copper or iron plated electrolytically on any of a number of metals, including copper, nickel, and iron. As a matter of fact, generally in electroplating one of the main objects to be attained is to cause the metal which is plated to firmly adhere to the member plated upon.

The principal object of my invention, however, is to enable a metal electro-plated on a metal to be readily stripped or removed therefrom, or in other words, to prevent the metal plated from strongly adhering to the metal plated upon.

I have discovered that when a metallic member is properly treated so as to provide the same with a thin surface layer or film of a substance containing selenium or comprising a compound of selenium, such as a selenid, a metal electrolytically plated on the member so treated may be easily stripped therefrom without danger of injuring or defacing the opposed surfaces of said member and metal, no matter how delicately they may be figured or designed; and in general, my invention resides in a metallic member adapted to be electro-plated with metal and having a surface layer or film of this character, and also in the process of providing the metallic member to be plated with such a layer or film.

While I shall specifically describe the application of my invention to the electro-plating of nickel, copper and iron on a metallic member formed either of copper, nickel or iron, it is to be distinctly understood that this is merely for the purposes of illustration, and that my invention is

equally applicable to the plating of any of the metals mentioned on members formed of metals other than copper, nickel, and iron, as well as to the plating of metals other than those mentioned on members formed of either copper, nickel or iron, or any other suitable metal.

In carrying out my invention in the electro-plating of a member formed of either copper, nickel or iron with nickel, copper or iron, I first preferably clean such member in a suitable manner so as to remove dirt and grease therefrom. The cleaned member is now immersed or otherwise subjected to the action of a solution of selenious acid. The metal of which the member is formed will reduce the selenium from the selenious acid and combine therewith to produce on the surface of the member a thin integral surface layer or film of selenid of the metal. In case the member is formed of copper, it is subjected to the action of the solution of selenious acid until the layer or film of selenid of copper formed thereon has a reddish tint and preferably until such layer has a dark red tint.

Nickel, copper or iron or any one of a number of other metals, including silver, may now be electro-plated on the member provided with the thin integral surface layer or film of selenid in the usual manner and then stripped or removed therefrom. The presence of the thin surface layer or film of selenid enables any of these metals electrolytically plated on this member to be very readily removed or stripped therefrom without danger of defacing the opposed surfaces of such metal and member. In case the member plated is formed of copper, I find that best results are obtained when the film or layer of selenid of copper produced on such member has a dark red tint.

Metals may be very economically provided with a surface layer or film such as described herein. For example, in the case of copper, three cubic centimeters of a solution of selenious acid containing five per cent. of selenium, when mixed with two hundred cubic centimeters of water, will suffice to cover a surface having an area of one and one-half square feet with a film of selenid of copper having a dark red tint.

In the drawing accompanying and form-

ing a part of this specification, the single figure is a view in perspective, partly broken away, showing a metallic member provided with a surface layer or film in accordance 5 with my invention.

Referring to the drawing, reference character 1 represents a metallic member such as a member of copper, on which it is desired to electro-plate another metal. The member 10 1 is provided with a thin surface layer or film 2 consisting of a material containing selenium such as selenid of copper, in the manner above described, so as to enable the metal which may be electro-plated on member 1, to be readily stripped therefrom. The thickness of the layer or film 2 is shown 15 greatly exaggerated.

It is to be understood that my invention is not to be limited to the plating of metals 20 on nickel, iron and copper only, for a member formed of any metal which will reduce selenium from selenious acid will, when immersed in a solution of selenious acid, automatically receive or be provided with a thin 25 surface layer or film of the selenid of the metal, which film will, as mentioned above, facilitate the stripping from such member of a metal electro-plated thereon.

Having now described my invention, what 30 I claim as new and desire to protect by Letters Patent is as follows:—

1. A metallic member upon which a metal is adapted to be plated electrolytically, having a thin surface layer or film consisting 35 of a material containing selenium, substantially as described.

2. A metallic member upon which a metal is adapted to be plated electrolytically, having chemically formed thereon a surface 40 layer consisting of a compound of the metal of which said member is formed and selenium, substantially as described.

3. A metallic member upon which a metal is adapted to be plated electrolytically, having a surface layer formed integrally with 45 such member and consisting of a material containing selenium, substantially as described.

4. A metallic member upon which a metal is adapted to be plated electrolytically, having a surface layer chemically formed integrally with such member and consisting of a compound of the metal of which said member is formed and selenium, substantially 55 as described.

5. A member formed of copper and provided with a surface layer of selenid of copper, substantially as described.

6. A member formed of copper and pro-

vided with a surface layer consisting of a 60 compound of selenium and copper, substantially as described.

7. A member formed of copper and provided with a surface layer of selenid of copper chemically formed integrally with such 65 member, substantially as described.

8. A member formed of a metal capable of reducing selenium from a compound thereof and provided with a surface layer consisting of a compound of such metal and 70 selenium, substantially as described.

9. A member formed of a metal capable of reducing selenium from a compound thereof and provided with a surface layer consisting of a selenid of such metal, substantially as 75 described.

10. The process of treating a metallic member upon which a metal is to be plated electrolytically, which consists in chemically forming thereon a surface layer of a 80 substance containing selenium, substantially as described.

11. The process of treating a metallic member which consists in cleaning said member and then forming thereon a surface layer 85 of a compound of selenium, substantially as described.

12. The process of treating a member consisting of a metal capable of reducing selenium from selenious acid, which consists in 90 chemically forming on such member a surface layer consisting of a compound of such metal and selenium by subjecting the member to the action of selenious acid, substantially as described.

13. The process of treating a member having a surface portion formed of metal capable of reducing selenium from selenious acid, which consists in chemically forming on said 95 surface portion a thin layer or film consisting of a compound containing selenium by subjecting such surface portion to the action of selenious acid, substantially as described.

14. The process of treating a member 105 formed of copper, which consists in subjecting the member to the action of selenious acid, substantially as described.

15. The process of treating a member formed of copper, which consists in subjecting such member to the action of selenious acid until the surface of such member becomes covered with a thin layer or film of selenid of copper having a reddish tint, substantially as described.

This specification signed this 18th day of June 1919.

THOS. A. EDISON.